Roll No. .....

(07/22-II)

5218

B. Sc. EXAMINATION

(Fourth Semester)

PHYSICS

Paper–VIII

Wave and Optics–II

Time : Three Hours *Maximum Marks : 40*

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. Use of scientific (non-programmable) calculator is allowed.

1. (a) On what factor does the optical rotation of a substance depend ? 1

   (b) What is importance of Fourier series expansion of a function ? 2

(c) What are nodal planes and unit planes ? 2

(d) What is meant by Astigmatism ? 2

Unit I

2. (a) Explain plane polarised, circularly polarised and elliptically polarised light. Describe, how these can be produced and detected. 5

(b) Calculate thickness of Quarter wave plate of calcite for wavelength 5460 Å. Given : principal refractive indices for calcite are 1.652 and 1.488. 3

3. (a) Describe construction and working of Lorentz Half shade device. 5

(b) A solution of camphor in alcohol in a tube 20 cm long is found to rotate the plane of vibration of light by 27°. Find mass per unit volume of the solution if specific rotation of camphor is 54°. 3

Unit II

4. Apply Fourier theorem to analyse a rectangular wave into simple harmonic components. 8

5. State Fourier theorem and determine Fourier coefficients. 8

Unit III

6. Develop a system matrix for thick lens and use it to derive the lens Maker's formula for thin lens. 8

7. (a) Explain finite and infinite sine and cosine Fourier transforms. 4

   (b) Find Fourier Transform of $f(x)$ if :

$$f(x) = \begin{cases} 1 & \text{for } |x| < a \\ 0 & |x| > a \end{cases}. \qquad 4$$

Unit IV

8. What is chromatic aberrations ? How is it related to dispersive power ? Also derive condition for Achromatism for two thin lenses in contact. 8

9. (a) Discuss the propagation of light in optical fibre. Explain single mode and multi mode fibres. 6

(b) A fibre has an acceptance angle of 30° and a core index of 1.5. Calculate refractive index of cladding. 2

QUESTION BANK OF HARYANA